REMARKS

Claims 4 and 7-10 are canceled without prejudice. Claims 2, 3, 5 and 11-16 are amended; marked up versions of the amended claims are attached hereto pursuant to 37 C.F.R. § 1.121(c)(ii). Claims 2, 3, 5 and 11-16 are pending in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

Applicant believes the foregoing amendments comply with requirements of form and thus may be entered under 37 C.F.R. § 1.116(a) as presenting rejected claims in better from for consideration on appeal. Alternatively, if these amendments are deemed to touch the merits, entry is requested under 37 C.F.R. § 1.116(b). These amendments were not earlier presented because they are in response to the matters pointed out for the first time in the Final Office Action.

Rejections Under 35 U.S.C. § 112, 1st Paragraph

Claims 11, 14 and 15 were rejected under 35 U.S.C. § 112, 1st paragraph. The Examiner takes the position that "It appears that applicant has not adequately described the embodiment in which the light-receiving element is inserted in the optical signal transfer device. Page 10 and Figures 4-5, simply mention and show the light-receiving element (67) inserted in contact holes (61a) and bonded to the optical signal transfer device, but not inserted in the optical signal transfer device."

Applicant respectfully disagrees and submits that the present application does disclose that "the light-receiving element is inserted the optical signal transfer device." Since the contact holes are part of the optical signal transfer device, inserting the light-receiving element into the contact hole necessarily implies that the light-receiving element is being inserted into the optical signal transfer device. There is no requirement under 35 U.S.C. § 112, 1st paragraph, that the precise nature of this relationship be specified in the claim. Accordingly, the rejection of claims 11, 14 and 15 was improper.

Nevertheless, in an effort to expedite the prosecution of this application, Applicant has elected to amend claims 11, 14 and 15 to recite that the "light-

receiving element is inserted into the contact hole and is bonded to the optical signal transfer device. Accordingly, based upon the above claim amendments, the rejection of claims 11, 14 and 15 under 35 U.S.C. § 112, 1st paragraph, is rendered moot.

Rejections under 35 U.S.C. § 112, 2nd Paragraph

Claims 3, 7, 9 and 14 were rejected under 35 U.S.C., 2nd paragraph, as being indefinite. In response, claim 3 has been amended to correct the antecedent basis problem. Claim 7 has been cancelled and therefore the rejection of claim 7 is rendered moot. With respect to the rejection of claim 9, the antecedent basis problem has been corrected. In rejecting claim 9, the Examiner takes the position that it is unclear how a light emitting surface transfers an optical signal from an arithmetic processing apparatus into the semiconductor chip." See also page 4 and pages 11-13 of the application. Accordingly, the rejection of claim 9 under 35 U.S.C. § 112, second paragraph, is rendered moot. Claim 14 was rejected at being indefinite by virtue of its dependency on indefinite claim 9. As discussed above, this ground over rejection is rendered moot since claim 9 is definite.

Art-Based Rejections

Claim 16 was rejected under 35 U.S.C. § 102(b) as being anticipated by Horowitz et al. [U.S. Patent 5,371,822].

Claim 16 has been amended to recite that the "optical signal transfer device" is "directly connected to the light-receiving element." Applicant respectfully submits that the Horowitz reference fails to teach or suggest this recitation of claim 16. Accordingly, the rejection of claim 16 under 35 U.S.C. § 102(b) is improper and should be withdrawn.

Claim 13 was rejected under 35 U.S.C. § 102(b) as being anticipated by Willis et al. [U.S. Patent 5,119,451].

Applicant has amended claim 13 to change the term "optical signal transfer device" to "optical fiber." By contrast, Willis teaches an optical waveguide 18, as shown in Figs. 15 and 19. In addition, Applicant submits that the Willis reference

fails to teach or suggest that the "at least one optical fiber" is disposed in a first plane "in the mounting substrate," as required by claim 13. As shown in Fig. 15 of Willis, the optical waveguide 18 is not disposed in the support surface 12. For at least these reasons, claim 13 is not anticipated by the Willis reference. Accordingly, Applicant respectfully requests that the rejection of this claim 13 be withdrawn.

Claims 4 and 2

Claims 4 and 2 were rejected under 35 U.S.C. § 102(b) as being anticipated by Frazier [U.S. Patent 5,199,087]. Claim 4 has been cancelled and dependency of claim 2 has been amended to such that claim 2 now depends from claim 3. Accordingly, this ground of rejection is moot.

Claims 4, 5 and 8

Claims 4, 5 and 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by Suzuki [U.S. Patent 5,834,841].

As noted above, claims 4 and 8 have been cancelled, thereby rendering the rejection of those claims moot. Claim 5 has been amended to include the recitations of claim 7. Specifically, claim 5 now requires that the optical signal is an optical clock signal. Applicant respectfully submits that the rejection of claim 5 is rendered moot by this amendment since Suzuki fails to teach or suggest an optical clock signal, as required by amended claim 5.

Claims 10 and 12

Claims 10 and 12 were rejected under 35 U.S.C. § 102(e) as being anticipated by Munoz-Bustamante et al [U.S. Patent 6,259,840]. Claim 10 has been cancelled without prejudice. Claims 12 and 15 have been rewritten in independent format. Accordingly, the rejection of claim 10 is rendered moot.

At page 7 of the Office Action, the Examiner takes the position that Munoz-Bustamante discloses "a plurality of selected ones of the optical signal devices extend in a first direction [in the plane of the paper], and wherein a plurality of others of the optical signal transfer devic s [represented as circles in the figure]

extend in a second direction [out of the paper] different than the first direction and intersect the plurality of selected ones of the optical signal transfer devices." Applicant respectfully submits that there is no support for this position.

With respect to the rejection of claim 12, Applicant respectfully submits that the Munoz-Bustamante reference fails to teach or suggest numerous recitations of claim 12 such as "the optical signal transfer device is formed in a lattice configuration." Fig. 4 of the cited reference does not suggest that the optical signal transfer device has a lattice configuration. Rather, reference numeral 33 and 32 show arrangements for mounting sites that are designed to receive an optical electronic device. Mounting site 32 is designed to receive a surface-mounted optical electronic device having optical pathways in the bottom surface. Mounting site 33 is designed to receive an optical electronic device having both optical pathways and electrical pin connections at the bottom surface of the device. There is nothing however that suggests that the optical signal transfer device itself be formed in a lattice configuration, as required by claims 12 and 15. Moreover, claim 12 also requires that selected ones of the optical signal transfer devices extend in a first direction and that selected others of the optical signal transfer devices extend in a second direction different than the first direction and intersects the plurality of selected ones of the optical signal transfer devices." Applicant respectfully submits that Munoz-Bustamante reference also fails to teach or suggest this recitation of claim 12. Accordingly, claim 12 is patentable over the cited reference.

Claim 3

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over either one of Frazier or Suzuki.

Claim 3 has been rewritten in independent format. In rejecting claim 3, the Examiner concedes that Frazier and Suzuki "do not specifically disclose a package in contact with and seals the chip and optical signal transfer device." However, the Examiner then takes the position that using a sealant material is notoriously well known and would have been obvious "to protect the chip of the transfer device from damage."

Applicant respectfully submits that the cited references fail to teach or suggest each of the recitations of claim 3. Accordingly, Applicant respectfully requests that the Examiner cite a reference that teaches or suggests "a package that is in contact with and that seals the semiconductor chip and a part of the optical fiber" in the context of claim 3. In the event the Examiner is unable to cite such a reference, then the rejection should be withdrawn.

Claim 11

Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki.

Claim 11 has been rewritten in independent format. In rejecting claim 11, the Examiner takes the position that "Suzuki does not specifically disclose the shape being a cylindrical shape. However, the particular type of shape of the light-receiving element is a matter of design choice. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a cylindrical shaped light receiving element in the apparatus of Suzuki, as desired, to more easily fit into the signal transfer device."

Applicant respectfully disagrees and requests that the Examiner cite a reference in support of his position. Applicant further submits that the particular shape of the light-receiving element would not be a matter of design choice.

Claims 9 and 14

Claims 9 and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshima et al. (U.S. Patent 5,757,989).

Claim 9 has been cancelled thereby rendering the rejection of claim 9 moot. Claim 14 has been rewritten in independent form. In addition, claim 14 has been amended to recite that the "light-receiving element is inserted in contact holes and bonded to the optical signal transfer device." Applicant respectfully submits that amended claim 14 is patentable over the cited reference to Yoshimura et al. since the Yoshimura et al. reference fails to teach or suggest numerous recitations of claim 14.

In rejecting claim 9, the Examiner concedes that Yoshimura et al. did not "specifically disclose the optical signal is from an arithmetic processing apparatus." Moreover, in rejecting claim 14, Examiner concedes that Yoshimura et al. did not "specifically disclose the shape of the light receiving element being a cylindrical shape or being inserted into the transfer device." However, the Examiner concludes that both of these limitations would be obvious matters of the design choice.

Applicant respectfully disagrees and requests that the Examiner cite a reference in support of his position. In the event the Examiner is unable to cite such a reference, then the rejection should be withdrawn.

Claim 15

Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Munoz-Bustamante et al.

Claim 15 has been rewritten in independent format. Claim 15 has also been amended to recite that the "light-receiving element is inserted in the contact holes and bonded to the optical signal transfer device."

In rejecting claim 15, the Examiner takes the position that Munoz-Bustamante do not specifically disclose "the shape being a cylindrical shape or inserting the receiving element into the transfer device. However, the particular type of shape of the light receiving element and connection configuration is a matter of design choice."

Applicant respectfully disagrees and requests that the Examiner cite a reference in support of this position. In the event the Examiner is unable to cite such a reference, then the rejection should be withdrawn.

Applicant believes the foregoing amendments place the application in condition for allowance and early, favorable action is respectfully solicited.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 337-6700 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

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Version with markings to show changes made:

Please cancel claims 4 and 7-10 without prejudice.

Please amend claims 2, 3, 5 and 11-16 as follows:

2. (Twice Amended) A semiconductor device according to claim [4] 3, wherein the optical signal transfer device is an optical fiber.

3. (Twice Amended) A semiconductor device comprising:

a semiconductor chip mounted on a mounting substrate and a light-receiving element formed in the semiconductor chip for receiving an optical signal;

an optical signal transfer device embedded in the mounting substrate, wherein the optical signal transfer device directly contacts the light-receiving element for transferring the optical signal into the semiconductor chip; and

[A semiconductor device according to claim 4, further comprising] a package that is in contact with and that seals the semiconductor chip and a part of the optical fiber.

5. (Twice Amended) A semiconductor device comprising:

a mounting substrate and at least one optical signal transfer device embedded in the mounting substrate for transferring an optical clock signal;

a plurality of semiconductor chips mounted on the mounting substrate; and

a light-receiving element formed in at least one of the semiconductor chips and that directly contacts the optical signal transfer device for receiving the optical clock signal,

wherein the optical clock signal is transferred among the plurality of semiconductor chips through the optical signal transfer device.

11. (Twice Amended) A semiconductor device, comprising:

a semiconductor chip and a light-receiving element formed on the semiconductor chip for receiving an optical signal, wherein the semiconductor chip is disposed in a first plane; and

an optical signal transfer device that directly contacts the light-receiving element for transferring the optical signal from an arithmetic processing apparatus into the semiconductor

chip, wherein the optical signal transfer device is disposed in a second plane that is spaced apart from the first plane.

wherein the optical signal transfer device is embedded in a mounting substrate on which the semiconductor chip is mounted [A semiconductor device according to claim 8], wherein the light-receiving element is formed in a cylindrical shape on the semiconductor chip on a side thereof that is opposite to the mounting substrate, and the light-receiving element is inserted in contact holes and bonded to the optical signal transfer device to thereby connect the light-receiving element to the optical signal transfer device.

12. (Amended) A semiconductor device, comprising:

a mounting substrate;

at least one optical signal transfer device embedded in the mounting substrate, wherein the at least one optical signal transfer device is adapted to transfer an optical signal;

a plurality of semiconductor chips mounted on the mounting substrate; and

a light-receiving element formed in at least one of the semiconductor chips and that is connected to the optical signal transfer device for receiving the optical signal,

wherein the optical signal is transferred among the plurality of semiconductor chips through the optical signal transfer device, wherein the optical signal transfer device is formed in a lattice configuration and embedded in the mounting substrate, [A semiconductor device according to Claim 10], wherein a plurality of selected ones of said optical signal transfer devices extend in a first direction, and wherein a plurality of selected others of said optical signal transfer devices extend in a second direction different than the first direction and intersect the plurality of selected ones of said optical signal transfer devices.

13. (Amended) A semiconductor device comprising:

a mounting substrate and at least one optical [signal transfer device] fiber disposed in a first plane and embedded in the mounting substrate for transferring an optical signal;

a plurality of semiconductor chips mounted on the mounting substrate, wherein the semiconductor chips are disposed in a second plane that is spaced apart from the first plane; and

a light-receiving element formed in at least one of the semiconductor chips and that directly contacts the optical [signal transfer device] fiber for receiving the optical signal,

wherein the optical signal is transferred among the plurality of semiconductor chips through the optical [signal transfer device] fiber.

14. (Amended) A semiconductor device comprising:

a semiconductor chip and a light-receiving element formed on the semiconductor chip for receiving an optical signal; and

an optical signal transfer device connected to the light-receiving element for transferring the optical signal from an arithmetic processing apparatus as an optical signal into the semiconductor chip, wherein the optical signal transfer device is a light-emitting surface that is formed in the mounting substrate, [A semiconductor device according to claim 9,]

wherein the light-receiving element is formed in a cylindrical shape on the semiconductor chip on a side thereof that is opposite to the mounting substrate, and the light-receiving element is inserted in contact holes and bonded to the optical signal transfer device to thereby connect the light-receiving element to the optical signal transfer device.

15. (Amended) A semiconductor device, comprising:

a mounting substrate;

at least one optical signal transfer device embedded in the mounting substrate, wherein the at least one optical signal transfer device is adapted to transfer an optical signal;

a plurality of semiconductor chips mounted on the mounting substrate; and

a light-receiving element formed in at least one of the semiconductor chips and that is connected to the optical signal transfer device for receiving the optical signal,

wherein the optical signal is transferred among the plurality of semiconductor chips through the optical signal transfer device, wherein the optical signal transfer device is formed in a lattice configuration and embedded in the mounting substrate [A semiconductor device according to claim 10], wherein the light-receiving element is formed in a cylindrical shape on the semiconductor chip on a side thereof that is opposite to the mounting substrate, and the light-receiving element is inserted in contact holes and bonded to the optical signal transfer device to thereby connect the light-receiving element to the optical signal transfer device.

16. (Amended) A semiconductor device comprising:

a semiconductor chip and a light-receiving element formed in the semiconductor chip for receiving an optical signal, wherein the semiconductor chip is disposed in a first plane; and

an optical signal transfer device directly connected to the light-receiving element for transferring the optical signal into the semiconductor chip,

wherein the optical signal transfer device is disposed in a second plane that is spaced apart from the first plane.